

Application No. 10/012,210
Reply to Office Action dated June 7, 2004

REMARKS

Claims 1-21 will be pending upon entry of the present amendment. Claims 1, 7-10, and 14 have been amended, and new claims 18-21 are herewith submitted.

Support for amendments to claims 1, 7, and 14 may be found in the specification at page 3, lines 23-25, and page 4, lines 10 and 11.

Support for the amendments of claims 9 and 10 may be found in the specification at page 3, lines 23-25.

The Examiner has rejected claims 1, 2, 4, 6, 7, 9, 10, and 12-17 under 35 U.S.C. § 102(e) as being anticipated by Brodsky et al. (U.S. Patent No. 6,595,784, hereafter Brodsky '784). Claims 1, 2, 4, and 6-17 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Markovich et al. (U.S. Patent No. 6,291,776, hereafter Markovich). Claims 3, 5, 8, and 11 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Brodsky '784 in view of Furnival (U.S. Patent No. 3,977,074), claims 3 and 5 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Markovich in view of Furnival, and claims 8 and 11 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Brodsky '784 in view of Markovich.

The Brodsky '784 reference cited in many of the rejections was issued on July 22, 2003, and bears a filing date of May 15, 2001. The present application bears a U.S. filing date of November 5, 2001, which was prior to the granting of the Brodsky '784 patent. Accordingly, Brodsky '784 qualifies as prior art only under § 102(e) and does not qualify as prior art under § 102(b), or any other section.

The present invention was conceived and reduced to practice prior to May 15, 2001, as will be shown hereafter.

Attached hereto is a declaration from inventors Stephen Hellriegel and Alex Yatskov, in which they jointly state that the present invention was reduced to practice prior to May 15, 2001. In particular, the declaration includes Exhibit A, a technical drawing of a device incorporating an embodiment of the invention as described and claimed in the present application. The technical drawing bears a signature date of July 11, 2000, and a revision date of October 31, 2000. In the declaration, the inventors state that a device according to the drawing

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was built and tested at some time between the signature date and the revision date. Accordingly, although the dates of Exhibit A should not be construed as defining a first reduction to practice, one embodiment of the invention was reduced to practice sometime during the period between July 11, 2000 and October 31, 2000.

In addition, Exhibit C of the attached declaration is a true copy of a page of notes taken by a representative of the firm, Seed Intellectual Property Law Group LLP, during a disclosure meeting with Messrs. Hellriegel and Yatskov, in which the inventors disclosed details of the invention to the representative, as made clear by the contents of the page of notes. The page of notes of Exhibit C is dated prior to May 15, 2001.

The declaration and attached exhibits are sufficient to remove Brodsky '784 as a prior art reference. Accordingly, the rejections that rely upon Brodsky '784, either singly, or in combination with other references, are moot, and so will not be addressed further. Applicants' silence with respect to these rejections is not to be construed as an acceptance on the part of the applicant with respect to the appropriateness of those rejections, absent the above referenced declaration.

Claim 1 recites, in part, "a strain relief structure, positioned between two of the plurality of contact pads." Markovich fails to teach at least this limitation of claim 1. In rejecting claim 1, the Examiner cites the plated through-holes (PTH) 10 of Markovich as being analogous to the strain relief structure of claim 1. Applicants respectfully traverse this position. Markovich, in fact, teaches that plated through-holes are actually a source of strain and deformation, rather than a strain relief. For example, Markovich states, "the closer the proximity of the plated through-hole to a BGA pad, this considerably increases the thermal deformation of the chip carrier at the location of the pad, adversely affecting product reliability through potential failures of the electrical connections at the pad position as a consequence of warpage of the organic material of the chip carrier." (Column 1, lines 29-35.) Markovich also states, "During reflow which produces thermal deformation or swelling of the organic laminate carrier . . . the deformation takes primarily place at the location of the plated through-hole and extend radially therefrom . . ." (Column 5, lines 1-5.)

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Clearly, Markovich recognizes that the plated through-holes are a source of stress, rather than a stress relief structure. Markovich is directed to a spacing method wherein plated through-holes are positioned equidistantly between ball grid array (BGA) pads on a chip carrier, and thereby minimizing the effect of the associated strain on any one of the BGA pads. For example, Markovich states, "the random distribution of the plated through-holes . . . leads to temperature induced stresses or strains tending to adversely effect the electrical connections at the pads and resultingly compromising the reliability thereof.

"In contrast with the foregoing, . . . the invention contemplates positioning the plated through-holes in a symmetrical placement or uniform spacing relative to the pads, thereby providing for an even and reduced stress distribution at the various BGA pads." (Column 4, lines 35-48.)

One having ordinary skill in the art would recognize that neither the plated through-holes, nor any other structure taught by Markovich, will actually reduce, in an absolute way, stresses induced in the chip carrier, but only provides for a method of moving the location of the stress as far as possible from the BGA pads that might be damaged thereby. Accordingly, Markovich fails to teach a strain relief structure, as recited in claim 1.

Clearly, claim 1 is allowable over Markovich for at least the reasons stated above. Dependent claims 2-8 are therefore also allowable with independent claim 1.

The Examiner has rejected claim 4 over Markovich, simply stating, "Markovich discloses the strain relief structure (aperture 10) is a thinned region of the substrate (14)." Applicants are unable to find any reference or figure of Markovich teaching a thinned region of the substrate. Applicants believe the Examiner may be speaking in reference to Markovich's Figure 4B, which shows a plated through-hole 10, which is much shorter than the thickness of the organic laminate carrier 14. However, as is made clear in the accompanying text in the first paragraph of column 5, Figure 4B actually shows the stresses induced by the plated through-hole on the laminate during heating of the device, caused by the difference in relative coefficients of thermal expansion of the metal of the plated through holes and the organic laminate. Figure 4B is actually a very good illustration of the stresses caused by the plated through-holes, further supporting the applicants' position that a plated through-hole is not a strain relief structure.

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Clearly, Markovich does not teach a strain relief structure in the form of a thinned region of a flexible substrate, as recited in claim 4. Accordingly, claim 4 is allowable for reasons beyond the allowability of base claim 1.

Claim 7 recites, "a plurality of electrical traces, each of the plurality of electrical traces being in electrical contact with a respective one of the plurality of contact pads and configured to place the respective contact pad in electrical contact with the second circuit board." Markovich fails to teach the limitation of claim 7. Markovich is directed to a chip carrier, as may be seen, for example, in the text at column 1, lines 5, 13-34, column 2, lines 45-55, and column 3, lines 16-41, to name only a few. One having ordinary skill in the art will recognize the term "chip carrier" as referring to a device configured to receive thereon a microchip die, and to provide an interface between the microchip and a circuit board. Accordingly, Markovich provides no teaching of a plurality of electrical traces configured to place contact pads, themselves configured to make electrical contact with contact pads of a first circuit board, as recited in claim 1, in contact with a second circuit board, as recited in claim 7. Accordingly, claim 7 is allowable on its own merits, apart from its dependence on an allowable claim.

Claim 8 recites, "wherein the strain relief structure is positioned such that it electrically interrupts one of the plurality of electrical traces." Markovich fails to teach the limitation of claim 8, teaching, in contrast, plated through-holes configured to provide electrical interconnection between different printed circuit layers (see column 1, lines 16-18). Such structures cannot be considered to electrically interrupt electrical traces. Accordingly, claim 8 is allowable over Markovich for reasons beyond its dependence on an allowable claim.

Claim 9 recites, in part, A first electrical connector, comprising: a flexible substrate; . . . [and] a plurality of electrical traces on the flexible substrate, each of the plurality of electrical traces being in electrical contact with a respective one of the plurality of contact pads and configured to provide electrical coupling with a second electrical connector Markovich fails to teach at least these limitations of claim 9. First, Markovich fails to teach a flexible substrate. MPEP § 706.02 states, "For anticipation under 35 U.S.C. 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present."

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Markovich is completely silent with respect to a flexible substrate, as recited in claim 9. Accordingly, in order to qualify as a prior art reference under § 102, Markovich must either imply a flexible substrate, or the flexibility must be inherent. There is no figure or passage of Markovich that implies that the substrate is flexible. Nor has the Examiner pointed to any passage as indicating or implying such flexibility.

With respect to the question of inherency, applicants acknowledge that there is, perhaps, no substance on earth that may be considered to be absolutely rigid, or perfectly inflexible. Thus, according to this absolute interpretation, because there is nothing in existence that is perfectly rigid, it must also be accepted that there is nothing in existence that is not flexible. Given this position, the term flexible, in any context, becomes redundant. However, in interpreting a term as it is used in a patent claim, such reasoning is not part of the interpretation of a claim term. Rather, one must consider the meaning of a term as understood by one having ordinary skill in the art. Such a one, in considering the organic laminate of Markovich's device, with respect to its flexibility, would consider many factors, including overall dimensions such as length, width, and thickness, and also including the particular composition of the organic laminate. It is well known in the art that organic laminates are widely used to manufacture substrates that are regarded as being rigid, as well as other substrates that are regarded as being flexible. Accordingly, inasmuch as Markovich has provided no information beyond the fact that the chip carrier is organic laminate (see, for example, column 1, line 8, column 2, line 46, column 3, lines 17, 24, and 34, and column 4, line 32), it cannot be considered that Markovich's chip carrier is inherently flexible.

Markovich also fails to teach electrical traces in contact with contact pads of a first electrical connector configured to provide electrical coupling with a second electrical connector, as recited in claim 9. In contrast, Markovich teaches a device configured to place a microchip in contact with a circuit board. For at least the reasons stated above, claim 9 is allowable over Markovich, together with dependent claims 18-20.

Claim 10 recites, "forming, on a first surface of a flexible substrate, a plurality of contact pads; forming, on the flexible substrate, a plurality of electrical traces, each of the plurality of electrical traces being in contact with a respective one of the plurality of contact pads,

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at least one of the plurality of electrical traces being configured to place the respective one of the plurality of contact pads in electrical contact with an additional connector; and forming, between two of the plurality of contact pads, a strain relief structure.”

Markovich fails to teach each of these limitations. Markovich fails to teach forming contact pads on a flexible substrate. Markovich fails to teach forming, on the flexible substrate, electrical traces configured to place contact pads in electrical contact with an additional connector, teaching instead a device configured to place a microchip in contact with a circuit board. Finally, Markovich fails to teach a strain relief structure between two of a plurality of contact pads, teaching, instead, positioning a strain causing structure in a position where the strain will have the least effect (see column 5, lines 3-8). This is not the equivalent of forming strain relief structures. For at least the reasons stated above, claim 10 is allowable over the cited prior art. Dependent claims 11-13 and 21 are thus also allowable.

Applicants believe that claims 11 and 21 are allowable on their own merits, apart from their dependence on allowable claim 10.

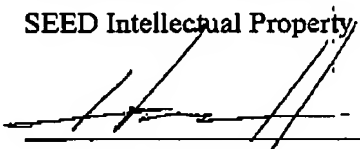
Claim 14 recites, in part, “a flexible substrate; . . . and means for increasing flexibility of the substrate in the contact region.” Markovich fails to teach these limitations of claim 14, and in particular, fails to teach a flexible substrate, and means for increasing flexibility of the substrate. The structures cited by the Examiner as teaching means for increasing flexibility are plated through-holes. Such plated through-holes are well known in the art, and are known to increase stiffness of a substrate. Markovich does not address substrate flexibility in any way, being, rather, directed to the problem of stresses caused by thermal expansion during solder reflow. Markovich does not teach that the plated through-holes increase flexibility. Claim 14 is clearly allowable over Markovich. Dependent claims 15-17 are also, therefore, allowable. With respect to the rejection of claims 3 and 5, the applicants have demonstrated that Markovich fails to teach all the limitations of claim 1, upon which these claims depend. Inasmuch as it has been demonstrated in previous papers that Furnival fails to teach the limitations of claim 1, Furnival cannot compensate for the inadequacies of Markovich, with respect to the limitations of claim 1. Accordingly, claims 3 and 5, as dependent claims on claim 1, are allowable over a combination of Markovich and Furnival.

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All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited. In the event the Examiner finds minor informalities that can be resolved by telephone conference, the Examiner is urged to contact applicants' undersigned representative at (206) 622-4900 in order to expeditiously resolve prosecution of this application.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,
SEED Intellectual Property Law Group PLLC



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HHB:wt

Enclosures:

Fax Cover Sheet
Extension of Time
Rule 1.131 Declaration
Exhibits A-C

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